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Industrial Area Characterization and Remediation Strategy FY2001 Update

Appendix C

September 2001

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ACRONYMS

AL	action level
ALARA	as low as reasonably achievable
ALF	Action Levels and Standards Framework for Surface Water, Ground Water, and Soils
AME	Actinide Migration Evaluation
AR	Administrative Record
ASD	Analytical Services Division
BZ	Buffer Zone
BZSAP	Buffer Zone Sampling and Analysis Plan
CAD/ROD	Corrective Action Decision/Record of Decision
CDPHE	Colorado Department of Public Health and Environment
CMS/FS	Corrective Measure Study/Feasibility Study
CRA	Comprehensive Risk Assessment
DOE	U.S. Department of Energy
DQO	data quality objective
EDD	electronic data deliverable
EMWD	Environmental-Measurement-While-Drilling
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
EROP	Environmental Restoration Operations Plan
ER RSOP	Environmental Restoration RSOP for Routine Soil Remediation
ET	evapotranspiration
FIP	Field Implementation Plan
FY	Fiscal Year
GIS	Geographic Information System
HDD	Horizontal Directional Drilling
HEPA	high-efficiency particulate air
HRC	Hydrogen Release Compound
HRR	Historical Release Report
H&S	Health and Safety
HASP	Health and Safety Plan
IA	Industrial Area
IA Strategy	Industrial Area Characterization and Remediation Strategy
IASAP	Industrial Area Sampling and Analysis Plan
ICD	Initial Conceptual Design
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
ISMS	Integrated Safety Management System
K-H	Kaiser-Hill Company, L.L.C.
LCDB	Land Configuration Design Basis
NFA	No Further Action
NLR	no longer representative
OPWL	Original Process Waste Lines

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PAC	Potential Area of Concern
PAM	Proposed Action Memorandum
PCOC	potential contaminant of concern
QA	quality assurance
QAP	Quality Assurance Plan
PU&D	Property Utilization and Disposal
RADMS	Remedial Action Decision Management System
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RSAL	Radionuclide Soil Action Level
RSOP	RFCA Standard Operating Protocol
SEP	Solar Evaporation Ponds
SOP	Standard Operating Procedure
SWD	Soil Water Database
SWWB	Site-Wide Water Balance
UBC	Under Building Contamination
V&V	verification and validation
VOC	volatile organic compound

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1.0 INTRODUCTION

The Industrial Area (IA) Characterization and Remediation Strategy (IA Strategy) (DOE 1999) was developed by the U.S. Department of Energy (DOE) during Fiscal Year (FY) 99 to provide a roadmap for final closure of the Rocky Flats Environmental Technology Site (RFETS or Site) IA and ensure integration of remediation activities, including facility decommissioning, characterization, remediation, and regulatory agency and stakeholder participation. This FY01 (October 1, 2000, through September 30, 2001) IA Strategy Update describes progress on IA Strategy components and changes to the IA Strategy. This Update is being incorporated into Appendix C of the IA Strategy.

Because the Environmental Restoration (ER) strategy and other Site activities affect the IA Strategy, information on Buffer Zone (BZ) activities, decommissioning activities, and other pertinent Site activities are included in this Update.

Major accomplishments during FY01 are finalization and approval of the Industrial Area Sampling and Analysis Plan (IASAP) (DOE 2001a), development of the Draft Buffer Zone Sampling and Analysis Plan (BZSAP) (DOE 2001b), development of the Draft Environmental Restoration Rocky Flats Cleanup Agreement (RFCA) Standard Operating Protocol (RSOP) for Routine Soil Remediation (ER RSOP) (DOE 2001c), development of the Remedial Action Decision Management System (RADMS), development and approval of the Asphalt and Soil RSOP (DOE 2001d), and development of internal ER work control streamlining strategy and documents. Key accomplishments of these projects include the following:

IASAP (Section 4.4.1)

- Completed the response to regulatory agency comments on the Draft IASAP;
- Issued the Final IASAP; and
- Developed the FY02 IASAP Addendum.

BZSAP (Section 4.4.2)

- Completed regulatory agency review; and
- Initiated the FY02 BZSAP Addendum.

RSOP for Routine Soil Remediation (Section 4.5.6)

- Issued the Draft RSOP for Routine Soil Remediation (ER RSOP) for public comment. The ER RSOP includes the following:
  - Protocol for contaminated soil and debris excavation;
  - Remediation decisions based on RFCA requirements, stewardship, and as low as reasonably achievable (ALARA) analyses;

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  - Resource Conservation and Recovery Act (RCRA) unit closure; and
  - Removal of other Site structures.

RADMS (Section 4.7.4)

- Developed a tool for managing closure data;
- Developed five modules:
  - Field Data Collection Management,
  - Verification and Validation (V&V),
  - Data Quality Objectives (DQOs),
  - Spatial Analysis/Geostatistics, and
  - Risk Screen;
- Developed software documentation
  - Functional Scope Document, and
  - Requirements Document;
- Initiated system test; and
- Initiated independent test of system.

RSOP for Asphalt and Soil Management (Section 4.5.6)

- Provided a consistent, streamlined approach to nonremediation asphalt and soil management;
- Replaced Standard Operating Procedures (SOPs) FO23 and FO29;
- Completed Responsiveness Summary; and
- Issued Final RSOP.

Work Control Streamlining (Section 4.8)

- Reviewed, consolidated, and standardized process to ensure routine work control requirements; and
- Completed development of programmatic Field Implementation Plan (FIP), Health and Safety Plan (HASP), and Quality Assurance Plan (QAP).

Other projects and programs that have an impact on IA activities, including the Annual Update to the Historical Release Report (HRR), and decommissioning interactions, are discussed in the appropriate sections.

2.0 REGULATORY FRAMEWORK

The RFCA Parties (DOE, Colorado Department of Public Health and Environment [CDPHE], and the U.S. Environmental Protection Agency [EPA]) evaluated current Radionuclide Soil Action Levels (RSALs) to determine whether revised RSALs were required. Results of this evaluation will be presented to the stakeholders in FY02.

3.0 DECISION FRAMEWORK

3.1 Site Closure

The ability to remediate many Under Building Contamination (UBC) Sites and associated Individual Hazardous Substance Sites (IHSSs) depends on building decommissioning, because ER remediation cannot begin until the buildings are gone. In the current Closure Project Baseline, many ER remediation projects do not begin until 2005 and 2006 and will be difficult to complete for 2006 closure. A new closure strategy for nonplutonium buildings will reduce impacts to the remediation schedule.

Decommissioning of nonplutonium buildings and ER remediation will be accelerated. The strategy is to decommission the South Side area (uranium Buildings 865, 886, 881, and 883) first, followed by the northeastern quadrant of the Site (Building 991), the central portions of the Site (Buildings 444, and 559), and finally, the western quadrant of the Site (Building 460, waste storage areas, and office facilities). Other tasks that will be completed in each area include waste consolidation and relocation and personnel relocation. Table 1 lists the anticipated dates for completion of facility decommissioning.

Table 1
Decommissioning and Remediation Acceleration Strategy

Facility	Decommissioning Completed
Building 886	3rd Quarter, FY02
Building 865	4th Quarter, FY02
Building 883	1st Quarter, FY03
Building 881	2nd Quarter, FY03
Building 850	2nd Quarter, FY03
Sanitary Sewer System	3rd Quarter, FY03
Water System	3rd Quarter, FY03
Building 331	4th Quarter, FY03
Building 334	4th Quarter, FY03
Building 441	4th Quarter, FY03
Steam System	4th Quarter, FY03
Building 551	2nd Quarter, FY04
Building 991	2nd Quarter, FY04
Building 444	3rd Quarter, FY04
Building 559	4th Quarter, FY04
Building 566	4th Quarter, FY04

Building 906	4th Quarter, FY04
Building 130	2nd Quarter, FY05
Building 440	2nd Quarter, FY05
Building 460	2nd Quarter, FY05
Building 664	2nd Quarter, FY05

3.2 Future Land Use

There are no FY01 changes to RFCA future land use assumptions; however, Colorado Senator Wayne Allard and Colorado Representative Mark Udall introduced joint legislation to make the BZ portion of RFETS a National Wildlife Refuge. The proposed bill calls for 6,400 acres of the Site to become a refuge after cleanup and closure is complete. At that time, the Site would be transferred to the U.S. Department of the Interior and maintained and protected as a refuge. DOE would retain any residual responsibilities for cleanup under existing environmental laws. If the proposed bill becomes law, RFCA Attachment 5, Action Levels and Standards Framework for Surface Water, Ground Water, and Soils (ALF) may need to be modified to reflect the change in land use. In addition, an onsite wildlife refuge worker exposure scenario will be developed through the risk assessment working group.

During FY01, the RFCA Parties decided to replace the potential Interim Record of Decision and RFCA Integrating Decision Document with a RCRA Facility Investigation/Remedial Investigation (RFI/RI) and Corrective Measure Study/Feasibility Study (CMS/FS) to describe actions and decisions for the interim end state. This will include future land use along with other closure decisions.

4.0 CHARACTERIZATION AND REMEDIATION APPROACH

4.1 Grouping of Sites

There are no updates to the grouping of IA sites. The BZ Groups are listed in Table 1 of the Draft BZSAP (DOE 2001b).

4.2 Integration With Decommissioning

Extensive efforts have been made over the past year to integrate environmental and decommissioning activities, projects, and organizational interfaces. This integration has included the development of key interface points as a decommissioning project transitions to ER. These interface points have been documented in both decommissioning and ER decision documents. Additional integration efforts include weekly meetings with the principal managers of both programs to discuss upcoming activities and potential issues. Finally, an ER representative has been assigned to coordinate the integration with the individual decommissioning projects. This individual attends periodic status meetings with the decommissioning projects to ensure that coordination occurs during the preparation of planning documents and project scoping with the agencies and stakeholders.

FY01 integrated projects include the following:

- Soil sampling beneath the Building 771 foundation slab; and
- Reconnaissance-Level Characterization at Buildings 111 and 333.

FY01 decommissioning accomplishments and activities that impact IA activities include the following:

- Removal of the Protected Area fence;
- Removal of equipment from Buildings 865 and 886;
- Completion of 19 of 32 dismantlement sets at the 771 Closure Project;
- Completion of 37 of 84 decommissioning sets at the 776 Closure Project; and
- Initiation of Buildings 111 and 333 decommissioning using the commercial model.

Decommissioning activities forecast for FY02 that will have a significant impact on the IA include the following:

- Implementing the nonplutonium building decommissioning acceleration activities;
- Decommissioning of the South Side Buildings 865 and 886 Building Clusters;
- Ongoing deactivation of Building 707;
- Ongoing decommissioning of Building 776;
- Ongoing decommissioning of Building 771/774; and
- Removal of large equipment from the 883 Building Cluster.

4.3 Risk and Dose Assessment Methodology

Risk and dose assessment methodology updates are described below.

4.3.1 Risk and Dose Assessment Methodology

There are no updates to the risk and dose assessment methodology. Neither CDPHE nor EPA has provided formal comments on the Draft Comprehensive Risk Assessment (CRA) Methodology.

4.3.2 Comprehensive Risk Assessment

Actinide Migration Evaluation

In FY01, the Watershed Erosion and Sediment Transport Model, which was developed as part of the Actinide Migration Evaluation (AME), was used to model land use and hydrologic scenarios. These scenarios included: (1) road revegetation; (2) BZ fire scenario; (3) changes to pond (and South Interceptor Ditch) configurations; and (4) future land configuration changes to be incorporated into the Land Configuration Design Basis (LCDB). The results of these scenarios on erosional transport of plutonium and americium will be available in November 2001. AME information is being used for the following purposes:

- Remediation to protect surface water;
- Remedial alternative development;
- Final Site configuration design;
- Watershed management and design; and
- Human and ecological risk assessments.

Site-Wide Water Balance

Closure activities and the final end-state configuration have the potential to significantly alter groundwater, surface water, and near-surface flow at RFETS. Additionally, many Site closure decisions cannot be made without first considering quantified predictions of effects on groundwater and surface water flow. The purpose of the Site-Wide Water Balance (SWWB) is to provide a management tool to evaluate how the sitewide hydrology is likely to change from current to final Site configuration.

The SWWB will provide information for the future IA configuration to protect surface water quality, the CRA, and the Final Corrective Action Decision/Record of Decision (CAD/ROD). The SWWB will also be used in predictions of surface water impacts from groundwater, current and final Site configuration, and final configurations of the Walnut Creek and Woman Creek drainages. The SWWB will be completed in mid-2002.

Land Configuration Design Basis

Work on the LCDB was initiated in FY01. The purpose of the project is to define the design basis upon which a final land configuration can be developed. In conjunction with identifying the functional design objectives and developing the design basis, three bounding scenarios were identified to represent relative extremes of distinct and unique approaches. These bounding scenarios represent a reasonable range of viable approaches and allow for evaluation of individual components of the condition. The bounding scenarios have been modeled and are currently being evaluated by the AME Project. Output from these evaluations will be used to aid in construction of an Initial Conceptual Design (ICD). This ICD will be used as a discussion point and to help guide

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decommissioning and ER interim decisions. Work will be completed on this phase of the project during the first quarter of FY02.

4.3.3 Data Quality Objectives

DQOs for IA sampling and analysis were incorporated into RADMS (Section 4.4).

4.4 Characterization Approach

4.4.1 Industrial Area Sampling and Analysis Plan

The Draft IASAP was presented to the regulatory agencies in September 2000 and was followed by several rounds of comments and responses. The IASAP was approved by CDPHE in June 2001.

IASAP Addenda

Two IASAP Addenda were developed during FY01: Building 771 Under Building Contamination (DOE 2001e) and the FY02 IASAP Addendum (DOE 2001f).

The Building 771Addendum included sampling and analysis at 16 locations beneath the Building 771 slab to evaluate potential contamination beneath the building slab. These data will be used to determine whether the building walls can remain in place during remediation (Sampling results are presented in Section 4.6.2.).

The FY02 IASAP Addendum includes sampling and analysis specifications for IHSS Groups 100-4, 100-5, 300-1, 300-6, 500-4, 500-6, 500-7, 600-1, 600-6, 700-12, 800-6, and 900-4&5. The IASAP Addendum contains maps of existing sampling locations and data, where available, and of proposed new sampling locations.

4.4.2 Buffer Zone Sampling and Analysis Plan

The Draft BZSAP (DOE 2001b) was presented to the regulatory agencies in July 2001.

BZSAP Addendum

The FY02 BZSAP Addendum includes sampling and analysis specifications for IHSS Groups 900-2 and NE/NW. The BZSAP Addendum contains maps of existing sampling locations and data, where available, and of proposed new sampling locations.

4.5 Remediation Approach

4.5.1 No Further Action

CDPHE and EPA provided comments on the 1996 and 2000 HRR Annual Updates. These comments were addressed in a response to the regulatory agencies and the data are incorporated in the 2001 Annual Update to the HRR (DOE 2001g). To date, 106 sites have been accepted as No Further Action (NFA) recommended sites, 169 require additional action, and 83 are pending regulatory agency comment.

4.5.2 Removal and Offsite Disposition

There are no updates to the removal and offsite disposition strategy.

4.5.3 Caps and Covers

The Present Landfill and Solar Evaporation Ponds (SEP) are two RCRA Interim Status Units that may be closed with evapotranspiration (ET) covers. In accordance with RFCA Attachment 10, caps and covers are presumptive remedies for these IHSSs. A conceptual design (representing approximately 30 percent of the total design) for the Present Landfill and SEP is being developed that includes the following:

- Design calculations and preliminary drawings;
- Cover thickness and soil type;
- Infiltration rates;
- Projected runoff;
- Feasibility evaluation
  - Lifecycle performance,
  - Capital and operating costs, and
  - Construtability; and
- Monitoring requirements.

An ET cover is also being considered for the Original Landfill. This option will be compared to other remedial alternatives in an Interim Measure/Interim Remedial Action (IM/IRA). Considerations include slope stability, presence of nearby Preble's meadow jumping mouse habitat, location within the Woman Creek drainage, and volume of waste and disposal risks and costs.

4.5.4 Plume Remediation

A plume of volatile organic compound (VOC)-contaminated groundwater is associated with a contaminant source located in the Property Utilization and Disposal Yard (PU&D Yard) at RFETS. Investigation results indicate that subsurface VOC contamination is present in only a few locations and that the primary contaminant is tetrachloroethene (K-H 2001).

A treatability study is in progress to evaluate the effectiveness of Hydrogen Release Compound® (HRC®) for enhancing natural attenuation of the VOCs in groundwater and soil at the PU&D Yard Plume. HRC® is a proprietary, environmentally safe, food-quality polylactate ester formulated for slow release of lactic acid upon hydration. The HRC® is expected to stimulate rapid degradation of chlorinated VOCs found in groundwater and soil at this location by making low concentrations of hydrogen available

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to the resident microbes to use for dechlorination. The HRC® is expected to be a one-time application. According to the manufacturer (Regenesis), the material is expected to stimulate contaminant degradation for approximately one year.

The groundwater plume map that illustrates the extent of VOC and nitrate plumes in the IA has been revised and is presented in the 2001 Annual RFCA Groundwater Monitoring Report (DOE 2001h).

4.5.5 Groundwater and Surface Water

There are no updates to groundwater and surface water strategy.

4.5.6 Decision Documents

RSOP for Asphalt and Soil Management

The RSOP for Asphalt and Soil Management was approved by CDPHE and EPA on August 28, 2001. The RSOP streamlines, into a single decision document, a compliant and environmentally protective approach for managing and temporarily replacing disturbed asphalt and soil at RFETS prior to final cleanup decisions. This RSOP replaces the existing SOPs FO.23 and FO.29 and ensures appropriate soil management in support of closure.

RSOP for Routine Soil Remediation

The Draft ER RSOP was developed during FY01 and the formal 45-day formal public comment period was initiated September 10, 2001. The ER RSOP describes the decisions and approach for excavation and disposal of contaminated soil and debris at IHSSs, Potential Areas of Concern (PACs), and UBC Sites in the IA and BZ. Routine remediation of contaminated soil and debris will primarily consist of excavation and offsite disposal, although treatment of VOCs to meet regulatory or disposal site requirements may be necessary. The ER RSOP also includes remediation and closure of RCRA units, underground storage tanks, foundation drains, and miscellaneous building slabs. The ER RSOP will:

- Provide a consistent approach to accelerated action decisions and remediation activities, which will enhance safety, quality, and compliance;
- Streamline the decisionmaking process by relying on one decision document instead of many; and
- Accelerate remediation schedules by eliminating numerous review cycles.

There are more than 200 potential release sites in the RFETS BZ and IA that are being considered for routine remediation under this RSOP because (1) the sites have similar potential contaminants of concern (PCOCs) that consist of radionuclides, organic compounds, or metals; (2) the sites may have debris (pipelines, wood, concrete, asphalt, drums, metal, plastics, rubber, fiberglass, or other debris) associated with the soil;

(3) contamination is limited to surface or subsurface soil contamination; (4) subsurface soil can be associated with UBC Sites and pipelines; (5) remediation of these sites does not require special engineering designs; and (6) these sites can be remediated by excavation and shipment of waste to offsite locations. The ER RSOP also covers foundation drains, tanks, and asphalt and concrete that are part of roads, parking lots, and orphan slabs.

The ER RSOP remediation process starts after characterization of the potential release sites. RFETS staff, in consultation with the regulatory agencies, reviews the characterization data and a decision is made whether site remediation is required, and if so, how much. Remediation decisions include evaluation of stewardship and ALARA considerations. Remediation activities are planned through the Site's Integrated Safety Management System (ISMS). Excavation of soil and debris is conducted in conjunction with "in-process" sampling to determine when remediation goals are achieved. The excavated soil and debris are segregated by waste type for disposal. This process results in an efficient, almost real-time implementation of characterization and remediation activities. Confirmation sampling will verify that remediation goals are met. All excavations will be backfilled, stabilized, and revegetated.

Supporting information provided in this RSOP includes regulatory requirements, and requirements and processes for environmental protection, work controls, waste management, decision management, health and safety (H&S), and quality assurance (QA).

4.6 Characterization and Remediation Challenges

4.6.1 Underground Pipeline Systems

The remediation strategy for the Original Process Waste Lines (OPWL), the sanitary sewer system, and storm drains is to remove soil contaminated above agreed-upon cleanup levels and associated pipelines, and leave in place those segments with soil concentrations below agreed-upon cleanup levels. There may be cases where soil contaminated above agreed-upon cleanup levels and associated pipelines will not be excavated but may require a different action. In these cases, an ER RSOP modification or Proposed Action Memorandum (PAM) will be developed.

Decommissioning staff will remove all OPWL, sanitary sewers, and storm drains within 3 feet of the existing grade within a building footprint or to the nearest junction. All remaining pipelines will be cut off at the building footprint boundary, or the nearest junction outside the building footprint, and sealed with a watertight permanent seal. Pipeline termination points will be surveyed and the decommissioning staff will provide a map of all pipeline and other utility terminations to ER.

Soil surrounding pipelines contaminated above agreed-upon cleanup levels will be excavated, treated as necessary, and disposed offsite. Pipelines associated with contaminated soil will also be excavated. Subsurface soil requiring remediation will be excavated with heavy machinery, including backhoes, front-end loaders, bulldozers, or

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vacuum systems. Cranes and other lifting equipment will be used for pipeline removal as necessary. Engineering and administrative controls will be implemented prior to and during excavation activities to control the spread of radiological and hazardous contamination in accordance with job-specific work control documents.

4.6.2 Under Building Contamination

Three UBC Sites, UBC 123, Building 886, and Building 771, were investigated during FY00 and FY01.

UBC 123 and Building 886

An innovative technique using horizontal directional drilling (HDD) coupled with Environmental-Measurement-While-Drilling (EMWD) was used to evaluate potential contamination beneath the 123 slab and Building 886. HDD is a horizontal borehole technology and EMWD is a gamma measurement instrument that monitors radionuclides in a borehole. Geoprobe drilling through floor slabs using conventional techniques was used as a comparison to HDD and to obtain additional data. This project was awarded a 2001 DOE Pollution Prevention Award for waste reduction.

Results of this study include the following:

- HDD/EMWD was effective in characterizing soil under active buildings and around OPWL and other underground utilities.
- HDD/EMWD reduced the amount of investigative derived waste.
- HDD/EMWD enhanced worker safety because it reduced exposure to unknown contamination.
- HDD/EMWD was significantly more expensive than Geoprobe sampling.
- There were limitations achieving the desired borehole direction and length.

Soil collected during this project was analyzed for both radiological and chemical constituents. Analytical data were verified and validated and the results were screened using the Data Quality Filter (DOE 2000). Data were evaluated against IASAP DQOs. The results of these analyses are summarized below.

- UBC 123: Lead exceeded the RFCA Tier I action level (AL) in one location on the northern side of the 123 slab.
- Building 886: No Tier I ALs were exceeded.

Further information on this study is available in the Final Data Summary Report for the Characterization of UBCs 123 and 886 (DOE 2001i).

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Building 771

The Building 771 Phase 1 UBC characterization sampling was completed in June 2001. This preliminary sampling was performed near the inside perimeter of the building to evaluate whether soil beneath the building foundation footing is contaminated and requires removal. The Phase 1 characterization was conducted to assist the Building 771 Decommissioning Project in developing a demolition strategy.

Phase 2 characterization sampling, to address the remainder of the potential Building 771 UBC, Building 774 UBC, and all associated IHSSs and PACs in the 700-4 Group, will be conducted when decommissioning starts. Phase 2 sampling activities are planned for completion in 2003.

The Phase 1 characterization sampling locations were selected in areas of known or suspected releases around the inside perimeter structural supports and along expansion joints and footings within the interior of Building 771. A total of 16 sampling points were identified. Soil samples were collected beneath the foundation slab from two depth intervals at each sampling location. Discrete samples were collected from the 0-to-2-foot and the 2-to4-foot depth intervals beneath the foundation using a hand auger. A total of 32 discrete samples were collected. Groundwater was encountered and sampled at 4 of the 16 sampling locations. The soil and groundwater samples were analyzed for both radiological and chemical constituents. Results of the sample analyses are summarized below.

- No analytes were detected above Tier I ALs in subsurface soil.
- Arsenic was detected above Tier II ALs in subsurface soil at all 16 sampling locations.
- No analytes were detected above RFCA Tier I ALs in groundwater.
- One or more actinides were detected in groundwater above Tier II ALs at the four locations where groundwater was encountered.
- One or more metals were detected in groundwater above Tier II ALs at all four locations.
- VOCs were detected in groundwater above Tier II ALs at two of the four locations sampled.

Further information on the Phase 1 characterization sampling in Building 771 is provided in the Building 771 Phase 1 Under Building Contamination Characterization Sampling Report (DOE 2001j).

4.6.3 903 Pad Lip Area

The 903 Pad Lip Area, a large area with surface and subsurface soil radiological contamination east and southeast of the 903 Drum Storage Area (903 Pad), presents

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numerous remediation challenges. These challenges include minimizing the environmental impact to the short grass prairie ecosystem and maintaining Site surface water standards while meeting agreed-upon cleanup levels. The scope of the cleanup effort is undetermined due to the current reevaluation of RSALS. However, the Site is evaluating a surface soil remedial technology that appears promising after initial field tests.

A Phase I treatability test was conducted in June 2001 at an offsite location to evaluate the effectiveness of using compressed air to dislocate the fine-grained portion of topsoil and then collect the displaced soil using vacuum techniques. Initial testing of field equipment indicated that vegetation prevented the air stream from reaching surface soil. Therefore, the 50-foot by 50-foot test plot was mowed and the cuttings were discharged to the ground surface prior to further testing. Subsequent modifications to the equipment and testing resulted in an increased area of excavation. Overall the technical feasibility was judged to be partially successful in meeting the listed performance criteria of precise excavation of the fine-grained soil fraction while leaving the coarse grained-fraction and a viable vegetative cover in place. The equipment was successful in dislodging the fine-grained soil fraction of the surface soil to an average depth of 1.5 to 2.5 inches while leaving cobbles and larger rocks in place. Quantitative surveys of the plant community within the test plot showed no substantial differences in plant cover, litter cover, rocks, or soil before and after testing of the vacuum treatment for soil. Improvements are required to increase the volume of dislodged soil recovered during the vacuum process. Recovery rates for excavated soil were estimated to be 60 to 70 percent.

A Phase II demonstration, also conducted offsite using full-scale equipment, is planned for September 2001. The full-scale equipment includes a redesigned vacuum system to increase recovery rates of excavated soil, containment of soils in a soft-sided waste container, and high-efficiency particulate air (HEPA) filtration of the exhaust of the vacuum system. The demonstration will also be conducted offsite over a 100-foot by 200-foot (0.5-acre) test plot.

4.7 Data Management

4.7.1 Existing Data

IA data generated during FY01 studies (UBC 123, Building 886, and Building 771) were screened using the Data Quality Filter (DOE 2000) and added to the IA database.

4.7.2 Comprehensive Data Compilation

The IA Data Summary Report (DOE 2000) is being updated to include data from Building 771 sampling (DOE 2001j) and characterization of UBCs 123 and 886 (DOE 2001i).

The Draft BZ Data Summary Report (DOE 2001k) was presented to the regulatory agencies in July 2001.

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4.7.3 New Data

New data were generated by two sampling programs during FY01: Building 771 sampling and characterization of UBCs 123 and 886. Results of these studies are described in Section 4.6.

4.7.4 Data Management Challenges

Effective management of environmental data is critical to the success of IA and BZ IHSS and PAC closure. Quality data is required for remedial decisions and use in the CRA.

Remedial Action Decision Management System

RADMS was developed to:

- Maximize the efficiency and quality of remedial action decisionmaking;
- Provide a real-time decisionmaking interface between the Kaiser-Hill Company, L.L.C.(K-H)/DOE team and the regulatory agencies; and
- Provide DOE with a legally defensible record by which to support the CAD/ROD at Site closure.

Specific objectives of RADMS are to provide a consistent and efficient tool to:

- Evaluate existing data and define additional sampling requirements;
- Coordinate field sampling activities, including locations, analytes, and media, with Analytical Services Division (ASD) laboratory systems;
- Track environmental samples and maintain chain-of-custody;
- Validate and verify field analytical data;
- Evaluate analytical data using Draft BZSAP (DOE 2001b) and IASAP (DOE 2001a) DQO criteria;
- Perform "what if" scenarios;
- Generate remedial target and post-remediation maps;
- Track IHSS, PAC, and UBC Site disposition;
- Track waste volumes;
- Track RCRA unit disposition;
- Estimate residual risk at IHSSs, PACs, and UBC Sites;

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- Facilitate consistent reporting; and
- Estimate the cost/benefit of remediation.

RADMS will use database, statistical, geostatistical, Geographic Information System (GIS), and risk tools to provide an integrated system for planning and managing all phases of ER characterization and remediation activities.

Major features of RADMS include the following:

- The system is self-contained. All functions required to achieve the system objectives are integrated and contained with the system components. This is necessary to maintain quality standards and minimize inefficiencies.
- The system will maintain appropriate and rigorous quality standards. This is necessary to ensure that the system maintains the ability to function as a decisionmaking tool and provide defensible information for Site closure.
- The system will integrate database functions with computation-intensive statistical, GIS, and risk functions. This will enable translation of sampling data into 2-D and 3-D remediation maps for excavation and post-remediation reconciliation of contamination site boundaries within the remediation area. Additionally, through exposure and screening-level pathway calculations, it enables an assessment of residual risk as characterization and remediation progresses towards closure.
- The system will use only qualified preliminary, verified, and validated analytical data for decisionmaking and final records. As a starting point, the system uses existing data screened using the IA Data Quality Filter (DOE 2000) from the RFETS Soil Water Database (SWD).
- The system is accessible to the regulatory agencies both onsite and offsite. The characterization and remediation strategy requires that decisions be made through the consultative process on a real-time basis. The Site closure schedule does not allow for time gaps between characterization and remediation activities.
- The system will use Site-approved software. This reduces cost, implementation time, and system integration issues.
- The system will maintain integrity with the SWD as the Site data archival system.
- The system will provide efficient and comprehensive reports and maps to directly support closeout reports, annual updates to the HRR, and other documentation to the Administrative Record (AR).

RADMS is being developed over two years. The first year (Phase I) consists of the following components:

- Field Data Management Collection – Collect field data (including sample tracking);
- V&V – Track, verify, and validate electronic data deliverables (EDDs) from field and analytical laboratories;

- DQOs – Evaluate data using IASAP and BZSAP DQOs;
- Spatial Analysis/Geostatistics – Evaluate data using statistical, geostatistical, and GIS techniques, and develop maps of sampling locations and remediation areas; and
- Estimate Risk – Estimate residual risks at remediated areas.

Additional features planned for FY02 include the following:

- RCRA unit closure tracking;
- Waste management;
- Cost/benefit analysis;
- Groundwater;
- Risk analysis;
- Automated reporting; and
- Digital photographs.

RADMS is currently undergoing rigorous testing by the development QA team and a team of independent subject matter experts.

Industrial Area Data Summary

Characterization data collected during FY01 were evaluated using the Data Quality Filter and against additional IA-specific criteria. Approximately 15,000 analytical records from UBC 123, Building 886, and Building 771 were added to the data set.

Buffer Zone Data Summary

No additional data were added to the Draft BZ Data Summary Report following submittal to the regulatory agencies for review.

Soil Water Database

Several tasks that improved data quality and accommodated the needs of IA characterization and remediation, and eventual CRA analysis, were completed through the cooperative efforts of the ER and Analytical Services groups. These accomplishments include the following:

1. Modified SWD standard query tool - Modified the standard query tool so that data administrators can correct data and enter data from hard copy analytical reports.
2. Corrected and correlated location data - Reviewed sampling locations to ensure consistency between SWD and the Site GIS including:

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- Reviewed and updated 1,146 borehole locations;
- Reviewed and updated 1,290 well locations;
- Reviewed 523 sediment locations, checked survey coordinates, and provided areal descriptions of the sampling locations;
- Reviewed 402 surface water locations, checked survey coordinates, and provided areal descriptions of the sampling locations.
- Reviewed 801 miscellaneous locations, checked survey coordinates, if available, and provided sample descriptions; and
- Reviewed 20 treatment system sampling locations, provided survey coordinates and descriptions of the sampling locations including the following:
  - Missing Field Event Data - Added missing field event data for environmental sampling projects (especially those associated with the IA) to ensure a link between field event data (when, where, who) and electronic analytical data, and
  - Corrected data packages that were incorrectly loaded during initial EDD load process, primarily 1997 and 1998 data.

3. Created sample depth table - Created a soil sample depth table to provide a one-to-one relationship between soil sample depth and analytical results. The table will significantly help users correlate analytical data to sample depth data.

4. Updated NLR (no longer representative) field - Analytical data packages that are "no longer representative" of site conditions (e.g., waste shipped offsite or soil removed/treated) were identified and the appropriate code (YES/NO) was added along with a journal comment describing the remedial action.

5. Developed an Environmental Data Management Procedure - Developed a new procedure for environmental data management. The procedure provides administrative directions for SWD data entry requirements.

4.8 Work Controls

The work control process for ER projects was reviewed and standardized to streamline the planning process. Activities and documentation that have been streamlined include the following:

- Soil Disturbance Permit process;
- HASP;
- ER Operations Plan (EROP);

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- Environmental Checklist;
- Readiness Assessment;
- Auditable Safety Analysis;
- Criticality Safety Review; and
- FIP.

FIP, HASP, and QAP addenda will be developed for individual projects as needed.

5.0 PROJECT INTERFACES

5.1 Health and Safety

A HSP was developed for ER characterization and remediation projects. Addenda to the HSP will be developed for specific project requirements.

5.2 Waste Management Program

An ER-specific Waste Management Plan was developed to provide ER project managers and subcontractors with consistent waste management guidance.

5.3 Analytical Services Division

ER staff will use field and onsite laboratory analytical instruments and onsite laboratories for characterization and remediation sample analyses in the IA in addition to ASD offsite laboratory capabilities. ER and ASD will interface throughout FY02 on several issues that will affect IA characterization activities as follows:

- QA for field and onsite laboratory analytical instruments;
- Data management; and
- Offsite analytical laboratory use.

5.4 Procurement

Two major procurements for characterization and remediation subcontractors were completed during FY01.

The characterization subcontractor will provide soil sampling and analytical services consisting of the following:

- Field sampling;

- Field analytical instruments;
- Onsite analytical laboratory;
- Sample shipping; and
- Surveying.

The remediation subcontractor will provide the following services:

- Contaminated soil and debris removal; and
- Waste disposal.

5.5 Resource Strategies

The characterization and remediation subcontractors will provide personnel for characterization and remediation tasks. Each contractor will have a full-time minimum staff onsite and will augment staff for high work volume periods.

5.6 Project Communication

ER staff communicate with a variety of Site organizations on both ongoing and as-needed bases. ER interaction with the decommissioning organization is described in Section 4.2.

6.0 REFERENCES

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